

WHAT IS CLAIMED IS:

1. A control system that is provided in a vehicle and controls an in-vehicle device, the control system comprising:

detecting means for detecting that the vehicle enters an operating state;

diagnosing means for executing a failure diagnosis on a diagnosis target when a given condition is effected;

a non-volatile memory where stored information is electrically rewritable, wherein the non-volatile memory includes a plurality of blocks, each of which can be stored with frequency information including an operating frequency that is a number of times the vehicle enters the operating state and a failure diagnosis frequency that is a number of times the failure diagnosis is executed;

outputting means for outputting execution information relating to the frequency information when it is externally requested that information regarding an execution frequency ratio of the failure diagnosis be outputted;

rewriting means for rewriting the frequency information included in a rewriting target block of the blocks, wherein an operating frequency included in the rewriting target block is increased when it is detected that the vehicle enters the operating state while a failure diagnosis frequency in the rewriting target block is increased when the failure diagnosis is executed; and

switching means for switching the rewriting target block from a given block of the blocks to a certain block of the

blocks, when at least one of a given operating frequency and a given failure diagnosis frequency in the given block reaches an overflow threshold,

wherein the rewriting means writes, as initial values, half of the given operating frequency and half of the given failure diagnosis frequency in the certain block, respectively, when the switching means switches the rewriting target block.

2. The control system according to Claim 1,

wherein the control system includes an engine control system that controls an engine of the vehicle, while the diagnosis target includes a component that affects composition of an exhaust gas of the engine.

3. The control system according to Claim 1,

wherein, when the switching means switches the rewriting target block from the given block to the certain block, the rewriting means retains the given operating frequency and the given failure diagnosis frequency in the given block, respectively.

4. The control system according to Claim 1,

wherein, when effecting the given condition is less frequent than effecting a certain condition where the vehicle enters the operating state and the failure diagnosis frequency does not exceed the operating frequency, the given operating frequency is only used for determining whether the overflow

threshold is reached, and

wherein, when the given operating frequency reaches the overflow threshold, the switching means switches the rewriting target block from the given block to the certain block.

5. The control system according to Claim 4,

wherein the rewriting means designates the rewriting target block based on the operating frequencies stored in the blocks.

6. The control system according to Claim 1,

wherein, when the switching means switches the rewriting target block, the rewriting means writes switching information in the given block, wherein the switching information indicates that the given block having the switching information has been used as the rewriting target block till the switching means switches the rewriting target block.

7. The control system according to Claim 6,

wherein the switching information is written as being substituted for one of the given operating frequency and the given failure diagnosis frequency in the given block.

8. The control system according to Claim 6,

wherein the switching information is a value that is greater than the overflow threshold.

9. A control system that is provided in a vehicle and controls an in-vehicle device, the control system comprising:

detecting means for detecting that the vehicle enters an operating state;

diagnosing means for executing a failure diagnosis on a diagnosis target when a given condition is effected;

a non-volatile memory where stored information is electrically rewritable, wherein the non-volatile memory includes a plurality of blocks, each of which can be stored with frequency information including an operating frequency that is a number of times the vehicle enters the operating state and a failure diagnosis frequency that is a number of times the failure diagnosis is executed;

outputting means for outputting execution information relating to the frequency information when it is externally requested that information regarding an execution frequency ratio of the failure diagnosis be outputted;

rewriting means for rewriting the frequency information included in a rewriting target block of the blocks, wherein an operating frequency included in the rewriting target block is increased when it is detected that the vehicle enters the operating state while a failure diagnosis frequency in the rewriting target block is increased when the failure diagnosis is executed; and

switching means for switching the rewriting target block from a given block of the blocks to a certain block of the blocks, when at least one of a given operating frequency and a

given failure diagnosis frequency in the given block reaches an overflow threshold,

wherein, when the switching means switches the rewriting target block, values of zero are stored as initial values in the certain block.

10. The control system according to Claim 9,

wherein the control system includes an engine control system that controls an engine of the vehicle, while the diagnosis target includes a component that affects composition of an exhaust gas of the engine.

11. The control system according to Claim 9,

wherein, when the switching means switches the rewriting target block from the given block to the certain block, the rewriting means retains the given operating frequency and the given failure diagnosis frequency in the given block, respectively.

12. The control system according to Claim 11,

Wherein, when the switching means switches the rewriting target block at least one time and it is externally requested that information regarding the execution frequency ratio of the failure diagnosis be outputted, the outputting means outputs the execution information after dividing pieces of the frequency information in the blocks by respective divisors to compute a sum of the divided pieces of the frequency information, wherein

the sum is less than the overflow threshold.

13. The control system according to Claim 11,

Wherein, when a number of the plurality of the blocks is two, when it is externally requested that information regarding the execution frequency ratio of the failure diagnosis be outputted, and when the switching means switches the rewriting target block one time from the given block to the certain block, the outputting means outputs the execution information after dividing the frequency information in the given block by two and the frequency information in the certain block by one to compute a sum of the divided frequency information in the given block and the divided frequency information in the certain block as long as both of present values of the operating frequency and the failure diagnosis frequency in the certain block are not more than half of the overflow threshold.

14. The control system according to Claim 13,

Wherein the outputting means outputs the execution information after dividing, by two, both of the frequency information in the given block and the frequency information in the certain block to compute a sum of the divided frequency information in the given block and the divided frequency information in the certain block when at least one of the present values of the operating frequency and the failure diagnosis frequency in the certain block exceeds the half of the overflow threshold.

15. The control system according to Claim 9,
wherein, when effecting the given condition is less
frequent than effecting a certain condition where the vehicle
enters the operating state and the failure diagnosis frequency
does not exceed the operating frequency, the given operating
frequency is only used for determining whether the overflow
threshold is reached, and

wherein, when the given operating frequency reaches the
overflow threshold, the switching means switches the rewriting
target block from the given block to the certain block.

16. The control system according to Claim 15,
wherein the rewriting means designates the rewriting
target block based on the operating frequencies stored in the
blocks.